of a remote link in order to establish the optical wireless communication channel between them.

a2 Co-pending, commonly assigned patent application 09/940,763, filed concurrently herewith and entitled "Method and Apparatus for Aligning Optical Wireless Links" and incorporated herein by reference provides an approach to automatically acquire alignment between two optical wireless devices. --

Please replace the paragraph beginning at page 9, line 4, with the following rewritten paragraph:

a3 Figure 8 illustrates a second preferred embodiment re-acquisition alignment pattern;

Please replace the paragraph beginning at page 10, line 18, with the following rewritten paragraph:

-- OWL 4 communicates with OWL 6 over a collimated light beam 16. OWL 4 has a field of view 18 and the receiver of OWL 6 must be positioned within the field of view 18 for effective communication. Likewise, OWL 6 has a field of view 22 in which it can transmit a collimated light beam 20 to the receiver of OWL 4. As described in greater detail in co-pending patent application 09/620,943, signal to noise ration (SNR) is maximized when the light beams 16, 20 are centered on the photo-receivers of the receiving units 6, 4, respectively. The alignment of the light beam can be detected as a function of received optical power, signal intensity, and the like and this detected alignment information can then be fed back to the transmitter. Also described in greater detail in co-pending patent application 09/620,943 is a preferred embodiment mechanism for controllably steering the light beam. In addition to transmitting data to or from data from data source / sink 8, OWL 6 transmits the light beam alignment feedback signals to OWL 4 over light beam 20. Likewise, OWL 4 transmits beam alignment feedback signals to OWL 6 over its light beam 16, in addition to data to or from data source / sink 2. Because light beams 16, 20 are high bandwidth, low latency paths, the transmission of feedback signals over the beams allows for rapid alignment of the beams (low latency) without degrading the data handling capabilities of the system (high bandwidth). In the preferred embodiments, OWL devices 4 and 6 communicate with each other using standard 100 Mb/s Ethernet protocol. The inventive concepts described herein apply equally to other

a4 communication protocols, including ATM, TCP/IP, SONET, IEEE 1394, IRDA, 10 Mb/s Ethernet, Gigabit Ethernet, and other alternatives within the purview of one skilled in the art. --

Please replace the paragraph beginning at page 12, line 5, with the following rewritten paragraph:

a5 -- In the preferred embodiments, each OWL has beam steering capability providing a field of view 29 of ten degrees in both an x axis and a y axis, as shown in Figure 2. The neutral, or default position for the light beam is in the center of the field of view, as indicated by point 32. The beam can be deflected as much as five degrees along the x axis, in either direction, and as much as five degrees in either direction along the y axis. Hence, point 34 illustrates the beam having been deflected five degrees positively along the x axis and five degrees positively along the y axis. Point 36 illustrates where the light beam would point when it is deflected five degrees positively along the x axis and five degrees negatively along the y axis. Likewise, point 38 illustrates where the light beam would point when it has been deflected five degrees negatively in both the x and y axes, and point 40 illustrates the beam having been deflected five degrees negatively in the x axis and five degrees positively in the y axis. Of course, the beam could be deflected less than five degrees in either direction, and hence the beam could be deflected to point anywhere within the field of view 29. --

Please replace the paragraph beginning at page 13, line 10, with the following rewritten paragraph:

a6 -- Figure 3a provides further details for OWL 4. The following discussion applies equally to OWL 6. Data originating from data source / sink 2 and coming in over data connection 12 is received by PHY 24 where the data is converted from a serial format to a four bit parallel (MII) format, as is well known in the art. PHY 24 is a physical format converter that receives data in the format particular to the physical data connection to which it is attached and converts it into a media independent interface (MII) format that is not specific to a physical connection. From PHY 24, the data is passed to control logic 26 where the data may be encoded or decoded, supplemented with Operation / Administration / Maintenance (OAM)

data, formatted for further transmission, enclosed within an appropriate network packet, or other data handling as is well known in the art. In addition, control logic 26 will read from the data stream certain control packets for light beam alignment, as will be discussed in greater detail below. A second PHY device 28 receives the data from control logic 26 and converts is from the parallel MII format into a serial format specific to optical data transmission. In the preferred embodiments, PHY 28 converts the data to a standard physical layer protocol for fiber optic transmissions (e.g., 100Base-FX or SX). Other physical layer protocols, or a specialized optical wireless protocol could also be used. The data is then passed to optical module 30, where it is converted from an electrical format to an optical format and transmitted over light beam 16 to OWL 6, from where it will be transmitted to the appropriate destination such as data sink / source 8 by way of data connection 14. --

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Please replace the paragraph beginning at page 14, line 5, with the following rewritten paragraph:

-- OWL 4 operates as a receiver as well, in which case the data path is the opposite of that just described. Data from data sink / source 8 is processed by OWL 6 in the manner described above and transmitted optically to OWL 4 via modulated light beam 20. Optical module 30 detects the modulated light beam, converts it to an electrical signal, and passes the electrical signal to control logic 26 via PHY 28. Control logic 6 inspects the incoming signal and reads from it any control packets relating to beam alignment feedback, as discussed in greater detail below. The data stream is passed from control logic 26 to PHY 24 where it is converted to the appropriate physical format for transmission to data sink / source 2 over data connection 12. --

Please replace the paragraph beginning at page 14, line 16, with the following rewritten paragraph:

-- Further details of control logic 26, including the details of insertion and extraction of alignment feedback control signals will now be provided with reference to Figure 3b. In the preferred embodiment, control logic 26 comprises a TMS320VC5472 IP processor, available

from Texas Instruments, Dallas, Texas, although the following described features could be embodied in discrete devices, other integrated components, specialized hardware, or general purpose hardware running under appropriate software control. Control logic 26 includes media access controller (MAC) 32, which is connected to PHY 24 (Figure 2) and a second MAC 34 connected to PHY 28. As is well known in the art, the MACs have individual Ethernet addresses and are hence network addressable at the Ethernet protocol level. Connected between the MACs is an Ethernet switch 35 comprising direct memory access (DMA) 36 and Ethernet interface module (EIM) 39. The Ethernet switch 35 is responsible for detecting and extracting feedback control packets from the data stream as well as for inserting feedback control packets into the data stream. Feedback control packets are detected by Ethernet switch 35 on the basis of the Ethernet destination address contained within the packet, as will be discussed in greater detail below. Control packets are inserted into the data stream by storing incoming packets or frames of data in a buffer, and inserting a control packet between the data packets or frames, under the control of advanced RISC processor (ARM) core 40. --

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Please replace the paragraph beginning at page 15, line 10, with the following rewritten paragraph:

-- Referring again to Figure 1, during operation, OWL 4 will have its light beam 16 aligned to the photodetector of OWL 6 and OWL 6 will have its light beam 20 aligned to the photodetector of OWL 4. As discussed in greater detail in co-pending patent application docket number 09/923,510, both OWL 4 and OWL 6 will periodically transmit a control packet containing beam alignment information to the other OWL device. Figure 4 illustrates an exemplary control packet 45 having various fields for identifying the source of the packet, the destination for the packets, control fields, identification fields, and the like, and a data field 68. Figures 5a and 5b provide further details for the data field 68. Note in particular that data field 68 includes beam alignment and positioning information, such as "My X" and "My Y" fields 88 and 90, respectively relating to the orientation of the beam of the device that transmitted the control packet as well as "Your X" and "Your Y" fields 92 and 94, respectively, containing orientation information for the beam that was received by the transmitting device from the other

device. Also included is additional alignment such as "Quad Position X" field 96 and "Quad Position Y" field 98 and other fields that are used for aligning the light beams during an initial alignment acquisition procedure, as discussed in greater detail in co-pending provisional patent application number 60/285,461. These beam orientation and alignment field values 74 through 102 are stored in memory in OWL 4 (and the corresponding values for OWL 6 are stored in the memory of OWL 6). In a preferred embodiment, the values are stored in general memory 41, as shown in Figure 3. In other embodiments, the alignment and orientation information could be stored in special purpose registers, in non-volatile memory cells, on a hard disk drive or other magnetic storage or optical medium, or the like. --

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Please replace the paragraph beginning at page 16, line 8, with the following rewritten paragraph:

-- In the following discussion, it is assumed that OWLs 4 and 6 have been aligned to one another and have begun to transmit data between them, such as data originating at data source / sink 2 and destined for data source / sink 8. It is further assumed that at some point during operation, communication between the OWLs has ceased because one or both of the devices has stopped receiving the modulated light beam of the other device. The following discussion will be in the context of OWL 4 having "lost" the light beam of OWL 6, although the teachings apply equally to OWL 6 having "lost" the light beam of OWL 4, or both OWLs having lost alignment with the incoming beam. --

Please replace the paragraph beginning at page 24, line 5, with the following rewritten paragraph:

-- The OTU 324 can also be of conventional design. For example, a TTC-2C13 available from TrueLight Corporation of Taiwan, R.O.C., provides an advantageous and low cost optical transceiver unit, requiring only a single +5V power supply, consuming low power, and providing high bandwidth. However, it should be noted that OTU units of conventional design can provide less than optimal performance, since such units are typically designed for transmitting and receiving light from fibers. This results in three problems that

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should be noted by the designer. First, light is contained in such units and is thus not subject to the same eye safety considerations as open air optical systems such as the present invention. Consequently, such units may have excessively high power. Second, light is transmitted to a fiber and thus has optical requirements that are different from those where collimation is required, as in embodiments of the present invention. Third, light is received by such units from a narrow fiber, and therefore such units usually have smaller detector areas than desired for embodiments of the present invention. Accordingly, it is considered preferable to assemble a transceiver having a photodiode and optical design such that the maximum amount of light is collected from a given field of view. This requires as large a photodiode as possible, with the upper limit being influenced by factors such as photodiode speed and cost. In any event, a preferred light source is a vertical cavity surface emitting laser, sometimes referred to as a VCSEL laser diode. Such laser diodes have, advantageously, a substantially circular cross-section emission beam, a narrow emission cone and less dependence on temperature. --

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Please replace the paragraph beginning at page 26, line 11, with the following rewritten paragraph:

-- It should also be understood that more than one Optical Transceiver Unit 324 may be provided in some embodiments, for example to provide multiple wavelengths to transmit information across a single link, in order to increase the bandwidth of a given OWL link. This involves generating light beams having multiple wavelengths and collecting and separating these separate light beams. Numerous apparatus and methods are taught in co-pending patent application 09/839,690, filed concurrently herewith and incorporated herein by reference. --

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